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phases, solid, liquid, gaseous. Then systems containing two and three components are taken up and classified and treated according to the nature of the phases. Systems consisting of more than three components having as yet received but little experimental attention, the general theory of systems of four components together with such data as are at hand is given in the concluding chapter.

The author is full of enthusiasm for his subject, and has collected together about all that has been done along this line. Nevertheless, in some of his criticisms and discussions we might wish for greater breadth of view, and in certain points that are original with himself, more clearness.

All in all, the book is to be welcomed as a valuable aid in the study of the phenomena lying between the domains of Physics and Chemistry, and the reader will find in it novel and striking ideas about many things often regarded as trite and common. One point is especially worthy of note. Although the subject-matter pertains to chemistry and physics, nothing is said about atoms or molecules; the treatment is general and quite free from such suppositions the usefulness of which we are beginning to suspect we have in a measure outlived. C. E. L.

GRUNDZÜGE EINER THERMODYNAMISCHEN THEORIE ELEKTROCHEMISCHER KRÄFTE.

By *Dr. Alfred H. Bucherer*. Freiberg: Craz & Gerlach (Joh. Stettner). 1897. Pages, 144. Price, M. 4.

This little book is in main a criticism of the electrolytic dissociation theory by Arrhenius, and Nernst's theory of electromotive force; it also contains some animadversions on the modern theories of solutions.

The author has had great difficulty, he says, in getting a clear conception of the nature of ions, and thinks that "those phenomena, to which Arrhenius's theory owes its origin, that is, abnormal lowering of freezing point and abnormal osmotic pressures, find a more natural explanation in the assumption of an association of the dissolved substance with the solvent." This hypothesis of association is virtually a modification of the "Hydrate Theory."

The first three chapters of the book are devoted to the consideration of the Law of the Conservation of Energy and the Fundamental Principles of Thermodynamics. Emphasis is laid on the division of energy into two factors,—the intensity and the capacity factor.

A brief exposition of the ways in which thermodynamics is applied to electrochemistry, and of the various views on the nature of electrolytic conductivity leads up to the criticism of the recent views on these subjects and of the equations established by Nernst permitting of the calculation of electromotive force from data on temperature, osmotic pressure, and tension of solution. Now it must be admitted by even the most ardent partisan of these modern theories that there are some things about them that need clearing up; and whether we think the author has helped matters much or not, he will by his attack on their weak points at least have called the attention of others to them, and so assisted in their elucidation.

Particular stress throughout the book is laid upon the law of mass action, an independent deduction of which the author gives (pp. 68-72), adding a criticism of Nernst's deduction of the same law.

After a discussion of concentration cells and temperature coefficients, the author considers in separate chapters the influence on electromotive force that pressure, magnetism, gravity, capillarity, and diffusion exert. The concluding chapter treats of thermo-electricity, the original feature of the treatment being the application of the vapor tensions of the metals to the calculation of the electromotive force.

C. E. L.

OUTLINES OF PSYCHOLOGY. By *Wilhelm Wundt*. Translated with the Co-operation of the Author by *Charles Hubbard Judd, Ph. D.*, Instructor in Wesleyan University. Leipsic: Wilhelm Engelmann. New York: Gustav E. Stechert. 1897. Pages, 342.

The English translation of Professor Wundt's new *Outlines of Psychology* appeared shortly after the German work, having been translated with the co-operation of the author by Dr. Charles Hubbard Judd of Wesleyan University, and having been published by the same firm as the original, namely, Wilhelm Engelmann of Leipsic. The book was made in Germany and combines certain excellent features of both American and German books, good paper, clear print, flexible binding and an index. As a treatise the book affords "a systematic survey of the fundamentally important results and doctrines of modern psychology," viewed as a science by itself, having its own independent aims and proper coherency, and in this manner is differentiated from the author's *Grundzüge*, which treated psychology as a branch of the natural sciences, particularly physiology, and from his *Lectures on Human and Animal Psychology*, which dealt with the subject popularly and in its philosophical aspects. The ideas which lie at the basis of the treatment of the present work have left a distinctive impress on modern psychology and are known wherever Wundt is known. In their present concise and systematic formulation they constitute an introduction to the study of psychology at the hands of one of its greatest masters. Nevertheless there is something harsh and rigid in its treatment to the un-German mind; the terms, despite long use are still strange and unfamiliar, unsympathetic, and remote from our feeling. The translator who has done his work carefully and conscientiously has appended a glossary of the main German and English terms at the end of the book, a very valuable practice in the reviewer's opinion, to the need of which he called attention some time ago in *The Monist*. Alternative renderings might be suggested in some places, for it is not always necessary to adhere rigorously to a single rendering of a term in a scientific book. Words are used with freedom and take different shades from their context. The rendering of *angeboren* by "connate" might be supplemented by "innate," "native," "congenital," and "inborn." *Hilfsbegriff* is rendered by "supplementary concept" where "auxiliary concept" might perhaps be better. "Percep-